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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/751,349
Filing Date: January 05, 2004
Appellant(s): BROACH ET AL.

Daniel C. Abeles
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed March 19, 2007 appealing from the Office action mailed 18 July 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4,118,973	TUCKER ET AL.	10-1978
4,900,507	SHALLENBERGERE AL.	2-1990
5,473,650	JOHANSSON	12-1995
5,488,634	JOHANSSON ET AL.	1-1996
5,528,640	JOHANSSON ET AL.	6-1996

Kreith, F. et.al, Section 3 "Fluid Mechanics" Mechanical Engineering Handbook, Boca Raton; CRC Press LLC, 1999, pages 3-1 and 3-190 "Venturis"

Section 3 "Liquids in Motion" Mechanical Engineers' Handbook, Sixth Edition, McGraw-Hill Book Company, Inc. 1958, pages 3-59 through 3-65

W. Bussman, Ph.D, et al. Section 3 "Fluid Flow" Industrial Burners Handbook, CRC Press LLC, 2003, Figure 3.3 and section 3.3.3 Eduction Processes

Sherif, S.A. Section 42 "Fluid Measurements" The Engineering Handbook, Boca Raton; CRC Press LLC, 2000, Figure 42.6 "Venturi tube."

(9) Grounds of Rejection

Please note that the following rejections have NOT been maintained by the Examiner, The rejections set forth in sections 5A, 5B, 6A, 6B and 7B of the previous Office action mailed 7/18/2006.

The following ground(s) of rejection are applicable to the appealed claims:

A. Claims 1, 2 and 4-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellant regards as the invention.

1. Claims 1 and 12 are vague, indefinite and incomplete in what all is meant by and encompassed by the limitation "a series" because the figures only show one or two chamfers not a series. The term "series" connotes a broader meaning than the two adjacent chamfers disclosed within the specification. Additionally a

series of a plurality of discrete chamfers does not connote any particular chamfers, per se; hence the metes and bounds of the claim are undefined.

2. Appellant's 4/20/2006 amendment introduced the limitation "...concentric countersinks of different included angles and depths into the coolant flow through hole." to claims 1 and 2. The claims are vague indefinite and incomplete as to what all is meant by and encompassed by the phrase "...concentric countersinks of different included angles and depths into the coolant flow through hole."

3. Appellant's 4/20/2006 amendment introduced the limitation "...wherein the flaring at the lower face of said plate comprises a series of a plurality of straight, discrete, adjacent chamfers with each adjacent chamfer at a different angle than another adjacent chamfer relative to the axial direction of said fuel rods." (Underlining added to show added limitations) to claim 12. The claims are vague indefinite and incomplete as to what all is meant by and encompassed by the phrase "...wherein the flaring at the lower face of said plate comprises a series of a plurality of straight, discrete, adjacent chamfers with each adjacent chamfer at a different angle than another adjacent chamfer relative to the axial direction of said fuel rods." The Examiner makes the assumption that what Appellant is trying to describe is as set forth in Figure 6

4. Claims 1 and 12 are vague, indefinite and incomplete in what all is meant by and encompassed by the limitation "a series of a plurality" because the figures only show one or two chamfers. The term a series of a plurality is not defined in the specification, connotes other embodiments other than those disclosed and

cannot be given any definite particular meaning, that is the phrase "a series of a plurality" has no definite meaning and does not connote any particular number of, orientation of or specific arrangement and hence the metes and bounds of the claims are undefined.

B. Claims 1, 2, and 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger in view of any of U.S. Patent 4,997,621 to Johansson et al.('621), U.S. Patent 5,528,640 to Johansson et al.('640),U.S. Patent 5,473,650 to Johansson ('650) or U.S. Patent 5,488,634 to Johansson et al ('634).

Shallenberger discloses claim 1, a fuel assembly (10) for a nuclear reactor including a plurality of elongated nuclear fuel rods (22) having an extended axial length, at least a lowermost grid (20) supporting said fuel rods (22) in an organized array and having unoccupied spaces (52) defined therein adapted to allow flow of fluid coolant there through and past said fuel rods (22) when said fuel assembly (10) is installed in the nuclear reactor and a plurality of guide thimbles (18) extending along said fuel rods (22) through and supporting said grid (20), a debris filter bottom nozzle (12) disposed below said grid (20), below lower ends of said fuel rods (22), supporting said guide thimbles (18) and adapted to allow flow of fluid coolant into said fuel assembly (10), said debris filter bottom nozzle (12) comprising a substantially horizontal plate (46) extending substantially transverse to the axis of the fuel rods (22) and having an upper face directed toward said lowermost grid (20), said upper face of said plate (46) having defined there through at least two different types of holes, the first type

being a plurality of holes (66) receiving lower ends of said guide thimbles (18) where they are supported by said plate (46) and the second type being a plurality of flow through holes (48) extending completely through said plate (46) for the passage of coolant fluid from a lower face of said plate to the upper face of said plate, each of said coolant flow through holes (48) extending substantially in the axial direction of said fuel rods (22), in fluid communication with said unoccupied spaces (52), and in the extended direction at least some of said coolant flow through holes (48) having a profile substantially of a venturi, in Figures 1-10 and column 3 lines 24-54 and 67+, and columns 4-6, wherein it is understood that the entire chamfer (50) is indeed made up of, contains, and comprises a series of a plurality of individually discrete chamfers that when considered as a whole, make up the entire chamfer. For example, Shallenberger Figure 7, Item (50) can be considered not only as one chamfer, but also a plurality, or series of chamfers, i.e. chamfer (50) can be made by several different passes of chamfer making device, the first pass making only the first one millimeter of the chamfer, the second pass making the second millimeter, etc. until the chamfer reaches the desired depth. However in and of itself, the one chamfer alone can be considered to be made up of any number of discrete chamfers simply by choosing what exactly delineates a discrete chamfer. By stating that one discrete chamfer is one millimeter long then it appears chamfer (50) is made up of a plurality of approximately 4 to 5 discrete chamfers in series.

If Appellant is of the opinion that Shallenberger does not disclose discrete chamfers as explained by the examiner, then as shown by '634 Figure 5, '640 Figures 13, 15, 17, '650 Figures 5 and '621 Figures 5-E, at the time of the invention it would have been obvious to one of ordinary skill in the art to include discrete chamfers with adjacent chamfers at different angles to the axial direction of the fuel rods for the benefits of having highly sensitive control over increasing the pressure drop through the coolant channel ('621 column 7 lines 17-33). It is considered that '621 Fig 5E discloses discrete chamfers that read on item (95) and (70), '650 Figure 5 discloses discrete chamfers at the bottom of item 59 the black line just above the lower surface of item 30, i.e. just above indicia (56) on the left and just above indicia (58) on the right. '634 Fig 5 also discloses discrete chamfers which are considered the three horizontal lines above the bottommost line '640 discloses discrete chamfers in Fig 17 the lines just below indicia (260).

While patent drawings are not drawn to scale, relationships clearly shown in the drawings of a reference patent cannot be disregarded in determining the patentability of claims. See In re Mraz, 59 CCPA 866, 455 F.2d 1069, 173 USPQ 25 (1972).

It is noted that the claim language does not require adjacent chamfers to be at different angles to each other, only the axial direction of the fuel rods.

Shallenberger also does not disclose that the flow through holes (48) include a flaring at both ends.

All of the secondary references teach the use of flaring both ends of the coolant flow passages in the lower support plate of nuclear fuel assemblies in order to create venturi profiles for the benefits of minimizing pressure loss and maximizing the debris catching functions. See, for examples '634 Figure 5, column 4 lines 5-42, and column 8 lines 19-25, '650 Figures 3, 5, 9, and '621 Figures 4, 5C-E (particularly Figure 5D item (90)) and column 7 lines 17-33.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide flaring at both ends of the flow through holes, because of the advantages and benefits of increased flow, reduced pressure losses, smoother downstream flow, etc., as such results are no more than basic mechanical principles of fluid flow dynamics available within the art.

Claim 7 is clearly disclosed in Shallenberger, column 8 lines 2-26.

Claim 8 is clearly disclosed in Shallenberger, Fig 1 and column 5 lines 1-6

Claim 9 is clearly disclosed in Shallenberger, Figures 3 and 6.

Claims 10 and 11 are clearly disclosed in Shallenberger, column 8 lines 2-5.

Claim 12 is clearly disclosed in the rejection of corresponding parts above.

It is further noted that Claims 1 and 12 do not preclude the Examiners interpretation of the claim language because the terms "comprising" and "having" directly preceding the limitations "a series of a plurality of discrete chamfers with adjacent chamfers at different angles to the axial direction of the fuel rods" and " discrete double inlet chamfer" do not limit the claim to only those embodiments

disclosed. The terms "comprising" and "having" are open ended, meaning that at least the claimed limitations must be present, however there may be other items present than only those listed. Accordingly, Appellant's claim language does not define over the references as explained above.

C. Claims 4 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger as modified by any of U.S. Patent 4,997,621 to Johansson et al. ('621), U.S. Patent 5,528,640 to Johansson et al. ('640), U.S. Patent 5,473,650 to Johansson ('650) or U.S. Patent 5,488,634 to Johansson et al ('634) as applied to claims 1, 2 and 7-12 above and further in view of U.S. Patent 4,118,973 to Tucker et al.

With regard to claims 4, and 13-15, Shallenberger discloses Appellant's invention as modified and explained in section 7 above, including a series of a plurality of discrete chamfers on the inlet end.

If Appellant is of the opinion that Shallenberger does not disclose discrete chamfers as explained by the examiner, then as shown by '634 Figure 5, '640 Figures 13, 15, 17, '650 Figures 5 and '621 Figures 5-E, at the time of the invention it would have been obvious to one of ordinary skill in the art to include discrete chamfers with adjacent chamfers at different angles to the axial direction of the fuel rods for the benefits of having highly sensitive control over increasing the pressure drop through the coolant channel ('621 column 7 lines 17-33). It is considered that '621 Fig 5E discloses discrete chamfers that read on item (95) and (70), '650 Figure 5 discloses discrete chamfers at the bottom of item 59 the

black line just above the lower surface of item 30, i.e. just above indicia (56) on the left and just above indicia (58) on the right. '634 Fig 5 also discloses discrete chamfers which are considered the three horizontal lines above the bottommost line '640 discloses discrete chamfers in Fig 17 the lines just below indicia (260).

Shallenberger as modified in said section 7 above does not specifically disclose that the flow through holes (48) include a double angle chamfer on the inlet end.

Tucker et al. teaches some of the benefits of a flared/double angle inlet chamfer include; an appreciable reduction in pressure loss across the entire apparatus relative to those apparatus without a flared inlet (column 19 lines 22-27), minimization of pressure losses in the inlet due to inlet boundary wall imperfections (column 15 lines 12-22), "having a chamfered inlet portion which is rounded in both the upstream and downstream ends...of the entry portion would further improve the figure of merit (i.e. how well it works) relative to entry portions of the type shown in figures 12 and 13" (column 17 lines 55-60) and "a double chamfered inlet portion with the upstream angle having a steeper angle than the downstream chamfer...would also improve the figure of merit (i.e. how well it works) relative to entry portion in Fig 11 (Fig. 11 is a single chamfer inlet) " (column 17 lines 62+) in addition to Figures 14 and 15, columns 1 lines 19-23, column 14 lines 3-61, and 65+, column 16 lines 1-5, and column 18 lines 1-3.

It is further noted that Tucker et al. sets forth some of the theory behind the motivation to utilize venturi like or flared inlet geometries when dealing with

fluid flow in column 14 lines 40-50, i.e. flared inlet portions reduce the fluid acceleration gradients within the inlet portion consequently reducing the associated fluid viscous shear induced pressure losses which are in addition to all other fluid viscous shear induced pressure losses within the system.

Tucker is analogous art because it is teaching the principles of fluid flow through various orifice geometries for the benefits of minimizing pressure losses occurring within said orifices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet of the flow holes of Shallenberger as modified above by utilizing the teachings of Tucker et al to include a double edge chamfer (Figure 15) as well as a double angle chamfer approximating a curved surface (Figure14) for the benefits of increasing the discharge of the orifice, minimizing pressure losses, minimizing effects of inlet boundary wall imperfections, etc. as taught to be old and advantageous by Tucker et al. as such results can also be considered no more than optimization of the previous art, as set forth in even Appellant's own disclosure on page 2 lines 3 and page 8 lines 5-7, by using old and well known basic mechanical principles of fluid flow dynamics available within the art.

D. Claims 1, 2, 4 and 6-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger in view of either the Mechanical Engineering Handbook, CRC Press LLC, ©1999 or the Industrial Burners Handbook, CRC Press LLC ©2003 or the Mechanical Engineering Handbook, SIXTH EDITION,

McGRAW-HILL BOOK COMPANY, INC, ©1958 and further in view of either Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 or Tucker.

Shallenberger discloses claim 1, a fuel assembly (10) for a pressurized water nuclear reactor including a plurality of elongated nuclear fuel rods (22) having an extended axial length, at least a lowermost grid (20) supporting said fuel rods (22) in an organized array and having unoccupied spaces (52) defined therein adapted to allow flow of fluid coolant there through and past said fuel rods (22) when said fuel assembly (10) is installed in the nuclear reactor and a plurality of guide thimbles (18) extending along said fuel rods (22) through and supporting said grid (20), a debris filter bottom nozzle (12) disposed below said grid (20), below lower ends of said fuel rods (22), supporting said guide thimbles (18) and adapted to allow flow of fluid coolant into said fuel assembly (10), said debris filter bottom nozzle (12) comprising a substantially horizontal plate (46) extending substantially transverse to the axis of the fuel rods (22) and having an upper face directed toward said lowermost grid (20), said upper face of said plate (46) having defined there through at least two different hole designs, the first hole design being a plurality of holes (66) receiving lower ends of said guide thimbles (18) where they are supported by said plate (46) and the second hole design being a plurality of flow through holes (48) extending completely through said plate (46) for the passage of coolant fluid from a lower face of said plate to the upper face of said plate, each of said coolant flow through holes (48) extending

substantially in the axial direction of said fuel rods (22), in fluid communication with said unoccupied spaces (52), and in the extended direction at least some of said coolant flow through holes (48) having a profile substantially of a venturi, in Figures 1-10 and column 3 lines 24-54 and 67+, and columns 4-6, however Shallenberger does not appear to explicitly disclose that the flow through holes (48) include:

A. a flaring at both ends,

B. the flaring at the lower face comprises a series of a plurality of concentric countersinks of different included angles and depths into the coolant flow through hole.

C. the flaring at the lower face comprises a series of a plurality of straight, discrete, adjacent, chamfers with each adjacent chamfer at a different angle than another adjacent chamfer relative to the axial direction of the fuel rods

D. that some of the coolant through holes have a discrete double chamfered inlet with each adjacent chamfer of the double chamfered inlet at a different angle that the other adjacent chamfer relative to the axial direction of the fuel rods.

Regarding limitation A, "flaring at both ends",

Fluid Mechanics in Chapter 3 of the Mechanical Engineer's Handbook, CRC Press LLC ©1999 teaches on page 3-190 that a conical diffuser section downstream from the throat of a venturi gives excellent pressure recovery.

Chapter 3 Fluid Flow of the Industrial Burners Handbook, CRC Press LLC ©2003 also teaches in Figure 3.3 and section 3.3.3 that a conical diffuser section downstream of the throat of a venturi provides a transition to the downstream section and that typically this section is designed with small transition angles to provide smooth flow in order to reduce pressure losses.

Chapter 3 pages 59-65 of the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 teach the advantages of orifice geometry concerning fluid flow coefficients, divergence, friction, etc., through various orifices including venturis.

These references are analogous art because they are directed towards fluid flow through an orifice, which is directly pertinent to Appellant's particular problem and current concern.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide flaring at both ends of the flow through holes, because of the advantages of increased flow, reduced pressure losses, smoother downstream flow, etc., as such results are no more than basic mechanical principles of fluid flow dynamics available within the art.

Regarding the limitations B, C and D

Chapter 3 pages 59-65 of the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 further teach fluid flow through venturi's and orifices and that beveling the sharp upstream edge, even slightly, increases the discharge of an orifice. (see page 3-64 Rounding)

Rounding the inlet edge of an orifice can obviously take many forms (Fig. 6), from multiple angle bevels, to rounding. In the case of a rounded edge, it is understood that the inlet angle would be comprised of an infinite number of chamfer angles, including those proposed by Appellant.

As stated before, this reference is analogous art because it is teaching the principles of fluid flow through venturi's and orifices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet of the flow holes by increasing the bevel with a double edge chamfer as well as a double angle chamfer approximating a curved surface in order to increase the discharge of the orifice as such results are no more than optimization of the previous art as Appellant's disclosure states on page 2 lines 3 and page 8 lines 5-7 by using old and well known basic mechanical principles of fluid flow dynamics available within the art.

If Appellant is still of the opinion that Shallenberger as modified above does not specifically disclose that the flow through holes (48) include a double angle chamfer on the inlet end the Tucker can be relied upon to show such.

Tucker et al. teaches benefits of a flared/double angle inlet chamfer include; **an appreciable reduction in pressure loss across the entire apparatus relative to those apparatus without a flared inlet** (column 19 lines 22-27), minimization of pressure losses in the inlet due to inlet boundary wall

imperfections (column 15 lines 12-22), "having a chamfered inlet portion which is rounded in both the upstream and downstream ends...of the entry portion would further improve the figure of merit (i.e. how well it works) relative to entry portions of the type shown in figures 12 and 13" (column 17 lines 55-60) and **"a double chamfered inlet portion with the upstream angle having a steeper angle than the downstream chamfer...would also improve the figure of merit** (i.e. how well it works) relative to entry portion in Fig 11 (Fig. 11 is a single chamfer inlet) " (column 17 lines 62+) in addition to Figures 14 and 15, columns 1 lines 19-23, column 14 lines 3-61, and 65+, column 16 lines 1-5, and column 18 lines 1-3.

It is further noted that Tucker et al. sets forth some of the theory behind the motivation to utilize venturi like or flared inlet geometries when dealing with fluid flow in column 14 lines 40-50, i.e. flared inlet portions reduce the fluid acceleration gradients within the inlet portion consequently reducing the associated fluid viscous shear induced pressure losses which are in addition to all other fluid viscous shear induced pressure losses within the system.

Tucker is analogous art because it is teaching the principles of fluid flow through various orifice geometries for the benefits of minimizing pressure losses occurring within said orifices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet of the flow holes of Shallenberger as modified above by utilizing the teachings of Tucker et

al to include a double edge chamfer (Figure 15) as well as a double angle chamfer approximating a curved surface (Figure14) for the benefits of increasing the discharge of the orifice, minimizing pressure losses, minimizing effects of inlet boundary wall imperfections, etc. as taught to be old and advantageous by Tucker et al. as such results can also be considered no more than optimization of the previous art as even **Appellant**'s own disclosure states on page 2 lines 3 and page 8 lines 5-7 by using old and well known basic mechanical principles of fluid flow dynamics available within the art.

Claims 6, 16 and 17 are disclosed in The Mechanical Engineer's Handbook SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 section 3 pages 59 – 65, wherein it is apparent **Appellant** has translated/converted the table of claim 5 into mathematical equations stemming from typical venturi and orifice geometric relationships. As such, Appellants table and values are no more than standard mechanical properties/geometric relationships available within the art.

See MPEP § 2144.05 II "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955) and *In re Hoeschelle* 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (underlining added)

Claim 7 is clearly disclosed in Shallenberger, column 8 lines 2-26.

Claim 8 is clearly disclosed in Shallenberger, Fig 1 and column 5 lines 1-6

Claim 9 is clearly disclosed in Shallenberger, Figures 3 and 6.

Claims 10 and 11 are clearly disclosed in Shallenberger, column 8 lines 2-5.

Claim 12 is clearly disclosed in the rejection of corresponding parts above.

In response to Appellant's previous arguments that the Mechanical Engineer's Handbook, CRC Press LLC ©1999, Chapter 3 Fluid Flow of the Industrial Burners Handbook, CRC Press LLC ©2003, and the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 is **nonanalogous art**, it has been held that a prior art reference must either be in the field of Appellant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the Appellant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, these references are pertinent to fluid flow through orifices, the specific geometries of and uses for venturi's, including industrial applications, etc. Chapter 3, pages 59-65 of the Mechanical Engineering Handbook is specifically directed towards fluid flow through an orifice, which is directly pertinent to Appellant's particular problem and current concern, regardless of industrial application.

E. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger as applied to claims 1, 2, 4 and 6-17 above and further in view of further teachings of Chapter 42 Fluid Measurements of The Engineering Handbook, CRC Press LLC, ©2000

Shallenberger as modified above further discloses an inlet chamfer angle of 12 to 15 degrees in column 8, claim 3 lines 27-29, however Shallenberger as modified does not expressly disclose the chamfer angle of the outlet of the flow through hole.

As previously discussed, the "inlet chamfer A" falls within the range in the rejection of corresponding parts of section 8 above.

Figure 42.6 Venturi Tube teaches that the diffuser section (outlet chamfer C) of a venturi may have an angle range of 5-15 degrees.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet and outlet of the flow holes because of the advantages of increased discharge flow rate, decreased pressure loss of the orifice, etc., as such results are no more than standard practices and well known basic mechanical principles of fluid flow dynamics available within the art.

See MPEP § 2131.03 II Anticipation of Ranges, MPEP § 2144.05 Obviousness of Ranges as well as MPEP § 2144.05 II "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955) and *In re Hoeschelle* 406 F.2d 1403, 160 USPQ 809 (CCPA 1969)

In response to Appellants previous 12/8/04 arguments that MPEP § 2144.05 I and MPEP § 2144.05 II are only directed towards chemical ranges and not combinations of mechanical angles, it must be understood that these sections are not limited to only those specific cases and particular fields of endeavor, but are used as analogies for other arts and other cases. These cases are generalities showing that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." (Underlining added)

In response to Appellant's previous 12/8/04 arguments that the examiner's conclusion of obviousness is based upon improper hindsight reasoning and that the examiner is using Appellant's claimed invention as an instruction manual or template to piece together the teachings of the prior art by trying to isolate ranges rather than considering the combination of ranges, which are claimed together. In and of itself, It would have been prima-facia obvious to one of ordinary skill in the art to optimize Shallenberger by varying the angles of the inlet and outlet orifices, however the Examiner has provided **documentary evidence** showing **more than one reference** has used part if not all of Appellant's claimed range of desired coverage, and that those generally knowledgeable in the art are fully aware (and knowledgeable) of the ranges of angles proposed by Appellant and, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight

reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Appellant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

(10) Response to Argument

I.A. The Examiner has withdrawn the rejections requiring this argument, accordingly the argument is moot.

I.B. The Examiner has withdrawn the rejections requiring this argument, accordingly the argument is moot.

I.C. **Response to Argument on page 15 last paragraph through the last paragraph on page 16**, As Appellant states, the term "series" is "a number of things or events of the same class coming one after another". Appellant has set forth 2 discrete chamfers in the application as filed, NOT an unquantified number of chamfers. It appears that the current language reads on the actual venturis used in the prior art as well, not only the discrete chamfers that are the alleged invention under discussion. Since the claim was amended to include alternate embodiments outside of the original disclosure, the rejection is proper.

I.C. **Response to Argument on page 16 last paragraph through the SECOND paragraph on page 17**, The specification as filed failed to use the specific terminology set forth in the 4/20/2006 amendment surrounding the limitations concentric countersinks of different included angles..." Since there is no specification that sets

forth the metes and bounds of the limitations it is unclear whether Appellant is attempting to claim the invention disclosed in the figures or some broader undisclosed invention.

I.C. **Response to Argument on page 17 last paragraph through the SECOND paragraph on page 18,**

The specification as filed failed to use the specific terminology set forth in the 4/20/2006 amendment surrounding the limitations concentric countersinks of different included angles..." Since there is no specification that sets forth the metes and bounds of the limitations it is unclear whether Appellant is attempting to claim the invention disclosed in the figures or some broader undisclosed invention. It appears appellant is attempting to introduce new matter into the claims as explained in the previous Office action AND attempting to claim subject matter that is broader than the enabling disclosure, i.e. **"a series of a plurality of".** That is, the specification and drawings and charts appear to set forth only a double chamfered inlet, however Appellant is attempting to claim something broader than a double chamfered inlet. It also appears that Appellant agrees with the Examiner in the definitions of "series" and "plurality" (paragraph spanning pages 11 and 12 of the remarks received 4/20/2006 reproduced hereinbelow).

> "In Section 5B Claims 1 and 12 were objected to as being vague, indefinite and incomplete. The Examiner asserted in support of this objection that it was not clear:
>
> what all is meant by and encompassed by the limitation "a series" because the figures only show one or two chamfers not a series. The term "a series" connotes a broader meaning than the two adjacent chamfers disclosed within the specification. Additionally, a series of a plurality of

> discreet chamfers does not connote any particular chamfers per se, hence the metes and bounds of the claim are undefined.
> It would very much be appreciated if the Examiner would clarify what he meant by the latter sentence in the above quotation. The term "plurality" is defined as the state of being plural which means more than one. The term "series" is defined "as a number of things or events of the same class coming one after another in spatial or temporal succession". The combination of the terms provides **that there is more than one chamfer that occurs in tandem one after another.** (emphasis added)

However Appellant's use of these words in the claims does not connote any particular chamfers per se, i.e. a particular number of chamfers or orientation of them.

For example, with the current claim language, it is not possible to ascertain EXACTLY how many chafers are claimed or at what point another invention would infringe on the claim language. To put it another way, the claim language is so broad as to read on the venturi profiles already of record as each venturi does indeed have "a series of a plurality" of discrete chamfers (or "a number of more than one discrete chamfers coming one after another in spatial succession") with adjacent chamfers at different angles to the axial direction of the fuel rods because the limitation " a series of a plurality" has no definite metes and bounds and when interpreted in its broadest sense means a number of more than one discrete chamfers coming one after another in spatial succession which reads on the curve of inlet of a venturi. A curve is made up of an infinite number of tangential lines which would each be discrete and at different angles. The claim language does not connote only two chamfers or a double chamfered inlet. Again, appellants claim language is so broad that it reads on the venturis already of record.

Although the claims are interpreted in light of the specification, limitations from the specification are NOT imported into the claims. The Examiner must give the claim language the broadest reasonable interpretation the claims allow.

See MPEP 2111.01, which states

> While the claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims **must be interpreted as broadly as their terms reasonably allow**. In re American Academy of Science Tech Center, F.3d, 2004 WL 1067528 (Fed. Cir. May 13, 2004)

It appears Appellant's invention is focused on using only two straight chamfers to approximate a venturi to minimize manufacturing costs. This is further evidenced by Figures 5, 6 the sentence spanning page 8 of the specification as filed, and the tables within said specification. However the Examiner has already set forth how the use of a venturi in the nuclear art is notoriously old and well known and as such it is considered that its application to ANY area of a nuclear reactor where the benefits of a venturi could be utilized would be **an obvious place to employ a venturi therein**.

II. Claim Rejections under 35 U.S.C. 103, Response to Argument on page 19 end of the second paragraph,

Appellant states:

> M.P.E.P.2142. In the foregoing arguments, Applicants have shown where the Examiner has not carried that burden.

Response: The Examiner does not see where appellants have shown that the Examiner has not carried the burden of providing a suggestion to combine the

references of record with a reasonable expectation of success including all of the claimed limitations as set forth in the rejection of the claims in section 9 above.

Response to Argument beginning with the first paragraph on page 20,

First, As stated in section 2 of the 11/16/2005 Office action, the declaration received 9/1/2005 was defective because it did not state that the person making the oath or declaration had reviewed and understood the contents of the specification, including the claims, as amended by any amendment specifically referred to in the oath or declaration.

Second, it is not seen where any factual evidence was presented within the declaration. It is noted that Mr. Young's statements alone without presentation of factual evidence can only be construed as an opinion. No patentable weight can be given to an opinionated declaration. Consequently, said declaration cannot be relied upon as an adequate response to the issues presented in the office actions.

No weight is given to an opinion declaration on the ultimate Legal conclusion in issue. See In re Lindell, 155 USPQ 251. See also In re Pike et al, 84 USPQ 235.

Third, as stated in section 1 of the 7/18/2006, it is also considered that Applicant's statement "This is **not just the opinion** of an engineer, but the conclusion of an expert." (Remarks received 4/20/2006, Page 9, middle of last paragraph) supports the Examiners contention that the declaration is indeed "the opinion" of Mr. Young. Again Mr. Young's statements alone without presentation of factual evidence can only be construed as an opinion and no patentable weight can be given to an opinionated

declaration. Consequently, said declaration cannot be relied upon as an adequate response to the issues presented in the previous Office actions. Since Applicant is of the opinion that Mr. Young is an expert in the field then it is considered Mr. Young knew of and had access to **evidence** in support of his conclusion and should have submitted documentary evidence in support of his claims. Since Applicant was informed of the requirement and **no documentary evidence was submitted**, one can only conclude that such does not exist. Accordingly Mr. Young's opinionated declaration is AGAIN of no probative value.

A. Response to Argument beginning in the last paragraph on page 20, Claims 1, 2 and 7-12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shallenberger (4,900,507) in view of any of U.S. Patents 4,997,621 to Johansson et al. ('621), U.S. Patent 5,528,640 to Johansson et al. ('640), U.S. Patent 5,473,650 to Johansson ('650) or U.S. Patent 5,488,634 to Johansson et al. ('634).

1. The recitation **"pressurized"** has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Applicant's statement that the Johansson references are only directed to a boiling water reactor is not considered correct for at least the following reasons;

a. '640 makes the opening statement that the invention relates to "nuclear reactors in general" (Column 1, line 6) which is obviously generic to both PWR's and BWR's.

b. The Shallenberger and Johannsson patents are classified in the same class and subclasses, i.e. 376/ 352, 313, 443, etc.

Regardless of whether or not Johannsson is directed towards BWR's "in particular", the teachings cannot be ignored especially as the Examiner has shown how the Patent Office itself classified the inventions into the same subclasses.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Appellant continues to argue the merits of each individual reference without consideration for how the Examiner has interpreted and combined the references.

Further, Applicant's arguments are unpersuasive as applicant has not shown that the references do not teach what the examiner has stated they teach, nor has applicant shown that the examiner's reasoning for and manner of combining the teachings of the references is improper or invalid.

In response to applicant's argument that Tucker is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if

not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Tucker is analogous art because it is teaching the principles of fluid flow through various orifice geometries for the benefits of minimizing pressure losses occurring within said orifices.

Again, all of the Johannsson references show bottom nozzle filters with venturi profiles, they discuss the benefits of the venturi, and applicants invention is merely an obvious improvement over these references either through optimization or as taught explicitly by Tucker.

Further, one cannot simply ignore the teachings of the figures within the references themselves, and the claims are silent as to the shape of the coolant flow through holes. That is, Appellant argues that the '640 reference teaches square channels wherein the claims are silent to the horizontal cross section of said flow through holes, merely that said holes have a profile substantially of a venturi. The profile shown in the figures of patent '640 do indeed have a profile substantially of a venturi, regardless of the shape of the horizontal cross section.

2. **Regarding claim 2,** Applicant argues that the references do not teach a chamfer in the outlet end however All of the secondary references teach the use of flaring both ends of the coolant flow passages in the lower support plate of nuclear fuel assemblies in order to create venturi profiles for the benefits of minimizing pressure loss and maximizing the debris catching functions. See, for examples '634 Figure 5, column

4 lines 5-42, and column 8 lines 19-25, '650 Figures 3, 5, 9, and '621 Figures 4, 5C-E (particularly Figure 5D item (90)) and column 7 lines 17-33.

3. No argument proffered, therefore no response required.

4. Claim 12 is rejected for the same reasons as claim 1 above. Appellant proffered no further arguments, accordingly no response is required.

B. Response to arguments surrounding Claims 4, 6 and 13-17 being rejected under 35 U.S.C. § 103(a) as being unpatentable over Shallenberger as modified by any of the '621, '640, '650, or '634 patents as applied to Claims I, 2 and 7-12 above, further in view of the teachings of the Mechanical Engineers' Handbook, Sixth Edition, McGraw-Hill Book Company, Inc., copyright 1958.

Chapter 3 pages 59-65 of the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 further teach fluid flow through venturi's and orifices and that beveling the sharp upstream edge, even slightly, increases the discharge of an orifice. (see page 3-64 Rounding) Rounding the inlet edge of an orifice can obviously take many forms (Fig. 6), from multiple angle bevels, to rounding. In the case of a rounded edge, it is understood that the inlet angle would be comprised of an infinite number of chamfer angles, including those proposed by applicant.

This reference is analogous art because it is teaching the principles of fluid flow through venturi's and orifices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet of the flow

holes by increasing the bevel with a double edge chamfer as well as a double angle chamfer approximating a curved surface in order to increase the discharge of the orifice as such results are no more than optimization of the previous art as Applicant's own disclosure states on page 2 lines 3 and page 8 lines 5-7 by using old and well known basic mechanical principles of fluid flow dynamics available within the art.

1. Figure 9 of the Mechanical Engineers' Handbook clearly shows the inlet chamfers approximating a curved shape.

2. Claims 6, 16 and 17 are disclosed in The Mechanical Engineer's Handbook SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 section 3 pages 59 – 65, wherein it is apparent Applicant has translated/converted the table of claim 5 into mathematical equations stemming from typical venturi and orifice geometric relationships. As such, applicants table and values are no more than standard mechanical properties/geometric relationships available within the art.

See MPEP § 2144.05 II "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955) and *In re Hoeschelle* 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (underlining added)

3. Regarding claim 13, Shallenberger as modified does indeed disclose some coolant flow holes having a discrete double chamfered inlet.

4. Claims 14 and 15 have been disclosed in the rejection of corresponding parts above and no independent argument was proffered by Appellant in their defense, therefore no response is required.

5. Claims 16 and 17 have been addressed in section 2 immediately above.

C. Response to Argument surrounding Claims 1, 2, 4 and 6-17 being rejected under 35 U.S.C. §103(a) as being unpatentable over Shallenberger in view of either the Mechanical Engineering Handbook, CRC Press LLC, copyright 1999, or the Industrial Burners Handbook, CRC Press LLC, copyright 2003, or the Mechanical Engineers' Handbook, Sixth Edition, McGraw-Hill Book Company, Inc. copyright 1958.

The rejection of these claims set forth in section 9d above and a rereading of said rejection overcomes applicant's arguments as the Examiner has shown how each reference reads on the invention and WHY one would be motivated to combine the references in the manner set forth.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir.

1986). Appellant continues to argue the merits of each individual reference without consideration for how the Examiner has interpreted and combined the references.

Further, Applicant's arguments are unpersuasive as applicant has not shown that the references do not teach what the examiner has stated they teach, nor has applicant shown that the examiner's reasoning for and manner of combining the teachings of the references is improper or invalid.

1. The cited references are obvious to combine because they all deal with the flow of a fluid through an orifice.

2. It is clearly obvious from the references that venturi's are well known and well used in the art and that there are multiple reasons to combine the teachings of the references (decrease pressure drop, smooth downstream flow, etc.) REMEMBER WE ARE TALKING ABOUT THE BASIC THEORY OF WATER FLOWING THROUGH A HOLE.

3. Claim 4 is rejected for the same reasons as claim 1 above. Appellant proffered no further arguments, accordingly no response is required.

4. Claims 6, 16 and 17 are disclosed in The Mechanical Engineer's Handbook SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 section 3 pages 59 – 65, wherein it is apparent Applicant has translated/converted the table of claim 5 into mathematical equations stemming from typical venturi and orifice geometric relationships. As such, applicants table and values are no more than standard mechanical properties/geometric relationships available within the art.

5. Claims 7-11 is rejected for the same reasons as claim 1 above. Appellant proffered no further arguments, accordingly no response is required.

6. Claim 12 is rejected for the same reasons as claim 1 above. Appellant proffered no further arguments, accordingly no response is required.

7. Claim 13 is rejected for the same reasons as claim 1 above. Appellant proffered no further arguments, accordingly no response is required.

8. Claim 16 is rejected for the same reasons as claim 6 above. Appellant proffered no further arguments, accordingly no response is required.

9. Claim 17 is rejected for the same reasons as claim 6 above. Appellant proffered no further arguments, accordingly no response is required.

D. Response to Argument surrounding Claim 5's rejection under 35 U.S.C. §103(a) as being unpatentable over Shallenberger in view of the teachings of Chapter 42, Fluid Measurements of the Engineering Handbook, CRC Press LLC, copyright 2000

Shallenberger as modified above further discloses an inlet chamfer angle of 12 to 15 degrees in column 8, claim 3 lines 27-29, however Shallenberger as modified does not expressly disclose the chamfer angle of the outlet of the flow through hole.

As previously discussed, the "inlet chamfer A" falls within the range in the rejection of corresponding parts of section B immediately above.

Figure 42.6 Venturi Tube teaches that the diffuser section (outlet chamfer C) of a venturi may have an angle range of 5-15 degrees.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet and outlet of the flow holes because of the advantages of increased discharge flow rate, decreased pressure loss of the orifice, etc., as such results are no more than standard practices and well known basic mechanical principles of fluid flow dynamics available within the art.

See MPEP § 2131.03 II Anticipation of Ranges, MPEP § 2144.05 Obviousness of Ranges as well as MPEP § 2144.05 II "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955) and *In re Hoeschelle* 406 F.2d 1403, 160 USPQ 809 (CCPA 1969)

In response to applicants arguments that MPEP § 2144.05 I and MPEP § 2144.05 II are only directed towards chemical ranges and not combinations of mechanical angles, it must be understood that these sections are not limited to only those specific cases and particular fields of endeavor, but are used as analogies for other arts and other cases. These cases are generalities showing that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of

percentage ranges is the optimum combination of percentages." (Underlining added)

E. In response to applicant's arguments that the examiner's conclusion of obviousness is based upon improper hindsight reasoning and that the examiner is using applicant's claimed invention as an instruction manual or template to piece together the teachings of the prior art by trying to isolate ranges rather than considering the combination of ranges, which are claimed together. In and of itself, It would have been prima-facia obvious to one of ordinary skill in the art to optimize Shallenberger by varying the angles of the inlet and outlet orifices, however the Examiner has provided **documentary evidence** showing **more than one reference** has used part if not all of applicant's claimed range of desired coverage, and that those generally knowledgeable in the art are fully aware (and knowledgeable) of the ranges of angles proposed by applicant and, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

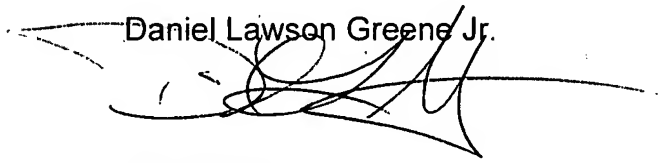
(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Daniel Lawson Greene Jr.



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